Leprecon®
Pro Lighting Equipment

LP-900 and LP-1000 Service Manual

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CONTENTS

1	Contents
2	Introduction and Specifications
3 & 4	Operating Precautions
5	Output Adjustment – Trimming
6, 7, 8	Repairs and Maintenance

DOCUMENTATION

10A	.....	Output Connector Pin Assignment
10B	.....	Leprecon Wiring – Internal
10C	.....	Internal Connector Pin Assignment
11A	30-1012	Power Supply Schematic
11B	.....	PCB Layout and Parts List
12A	30-1016	Grand Master Schematic
12B	.....	PCB Layout and Parts List
13A	30-1017	Crossfader Schematic
13B	.....	PCB Layout and Parts List
14A	30-1018	Preset Fader Schematic
14B	.....	PCB Layout and Parts List
15A	30-1015	Submaster Schematic
15B	.....	PCB Layout and Parts List
16A	30-0001C (6XDM)	Controller Module Schematic
16B	.....	PCB Layout and Parts List
17A	30-0002D (6XEM)	Electronics Module Schematic
17B	.....	Electronics Module Used as Output Buffer PCB Layout
17C	.....	Electronics Module Used as Preset Buffer PCB Layout
18A	30-1025	Chaser Schematic
18B	.....	PCB Layout and Parts List

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INTRODUCTION

Leprecon Models LP-900 and LP-1000 are portable lighting control consoles that are compatible with most dimming systems. They are designed for road use, and with reasonable care should require minimal service. Troubleshooting and repair are simplified by the use of modular electronics. This manual outlines procedures for safe and reliable operation of these consoles, and provides the necessary technical documentation for service.

SPECIFICATIONS

POWER IN:	Connector – Male U-ground inlet 105-125 VAC @ 50/60 Hz Current less than 1 amp
OUTPUT:	Connector – 27 pin male “Jones” type Maximum Out – Adjustable 5-15 volts Minimum Out – Adjustable 0-3 volts 24 volts available at pin 25 for fan relays Maximum output current – 15 mA/channel
SIZE:	LP-900 – 30 7/8” W x 18 ¼” D x 3 7/8” H LP-1000 – 29 5/16” W x 25 3/8” D x 4 7/16” H LP-1001 – 12 ½” W x 25 3/8” D x 4 7/16” H
WEIGHT:	LP-900 – 26 lbs. LP-1000 – 40 lbs. LP-1001 – 15 lbs.

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OPERATING PRECAUTIONS

PROPER SYSTEM GROUNDING

An essential ingredient to safe, consistent, reliable, and quiet operation of a lighting system is that the neutral and ground are not connected together at any point in the lighting system or in the house service except at the main transformer or service entrance, where the neutral is bonded to earth ground. Except at this one point, neutral and ground are totally separate, totally isolated, and very different terminals. The hot legs conduct power from the service through the dimmers to the load. The neutral conducts current not balanced between the legs from the load back to the main power source. It is a current carrying conductor: By definition a potential difference exists between any two points of a current carrying conductor. Current flows only when a potential difference exists. The only point at which the neutral and ground are at the same potential when any current is flowing in the neutral is at the one common point where the neutral and ground are physically tied together.

The ground serves two purposes: Its primary purpose is to connect all conductive parts of the system which can be touched by a person to earth ground potential so that a person with some other part of his body grounded will not become a conductor of electrical current (get hurt or killed) because of electrical leakage (perfect insulation doesn't exist) or because of a fault in equipment wiring.

Its secondary purpose is to shield the current carrying and electrical noise generating components in a system by connecting chassis and enclosures solidly to ground potential. In a situation where lots of sensitive audio equipment (much of it improperly grounded) co-exists, this function is very important.

Connecting the ground to neutral at any point other than the single bonding point at the main service causes neutral current to flow through the "ground" conductor; it is no longer at ground potential; it is no longer a ground; its function for safety and optimum system operation is impaired.

CONTROL GROUNDING

The control common should be totally isolated throughout the system, that is, not connected to ground or neutral in the board, stage boxes, or dimmers. Some dimmers have grounded control commons. This won't be a problem in itself, but will aggravate other possible faults.

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CONTROL GROUNDING (continued)

Please – before you attach your system to main power, perform this simple test. Connect an ohmmeter between your neutral and ground. If you read other than infinite resistance, you have a ground-neutral fault, which you must correct for your own safety, and for the proper operation of your system.

We have flown thousands of miles, and spent hundreds of hours (and charged many dollars) chasing down the strangest, most unpredictable and inexplicable lighting system problems only to find (after being reassured that the grounding was proper) that the removal of a bonding screw, a jumper wire, or repair of a shorted connector or instrument cured the problem. Check it out.

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OUTPUT ADJUSTMENT – TRIMMING

The output voltage of Leprecon consoles may be easily adjusted to be compatible with most dimmer systems. Trim is factory set for an output range of 0-10 volts, and may be readjusted by the trimmers in the upper left corner of the front panel.

Tools needed are: DC volt meter
Small slot screwdriver – 1/8" blade

Connect meter between control common (pin 26 or 27) and channel one output (pin 1). Set selector switch for scene X channel one to I (Independent). Set Ind. Fader to max and channel one fader (scene X) to min. Turn on power. Meter should read minimum output voltage.

Minimum: If 0 volts minimum is desired, trimmer for minimum is turned fully counter clockwise. If non-zero minimum is desired, turn minimum trimmer clockwise until meter shows desired output – 3 volts maximum.

Maximum: Set scene X channel one fader to full. Meter will read maximum output. Maximum trimmer can be turned clockwise to increase output voltage, counter clockwise to decrease it within the range of 5-15 volts. Set as desired.

Once set, output trim is usually stable and should not require adjustment.

Common dimmer requirements are:

Electronics Diversified – scrimmer	2 – 7.6V*
Berkey Colortran	0 – 12V
Skirpan (adjustable)	0 – 10V
Teatronics	0 – 10V
TTI	0 – 10V

*Also requires + 24 volts to activate cooling fan.

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REPAIRS AND MAINTENANCE

The most common repairs in Leprecon consoles will be replacing parts that are physically damaged. Failure of opamps and LEDs is rare, and easy to diagnose and repair.

The principal parts of a board subject to serious wear are the slide pots. They are vulnerable to dirt and other contamination. The grease in a slider that gives it a nice feel also traps dirt and dust. Unfortunately, there is no real way to remove the dirt and leave the grease. Cleaning sprays remove dirt but also remove the damping grease and will make the pots feel rough. Sliders should be spray cleaned only as a last resort. Never use tuner or contact cleaners, which contain abrasives on potentiometers! These are suitable for switches only. "BLUE STUFF" contains abrasive – it's good for switches and connectors – but do NOT use it on potentiometers! "JIFI" (from Workman) and "WISSH" (from G.C.) are good potentiometer and contact cleaners.

Leprecon consoles have a layer of fabric between the front panel and the slide pots to keep dirt from falling into the pots. Keeping the board clean is the only solution to prevent wear to the sliders. Ideally, the board should be kept covered when not in use. Vacuuming the console out occasionally helps too.

Dust and dirt will make the sliders feel gritty and wear more quickly. Spilled soft drinks leave a sticky caramel lacquer on matrix contacts and sliders. The main attention a control board needs is keeping contamination out of the electro-mechanical parts.

PLEASE consult with us before cleaning or lubricating the sliders.

Output circuits are not delicate, and can usually stand short circuits on outputs or even ribbon cables plugged in backwards without damage. Power supply regulators have current limiting and thermal shut-off, and will usually survive shorts without damage.

Simple isolated problems, such as a single dead control channel or a short between two channels, can usually be traced down quickly. Schematics include opamp pin numbers. DC voltage test will quickly show what's going on without removing PC boards.

The most serious problems in a console are those that affect many circuits, such as defects in the power supply, grand master and scene master or submaster. Problems in these circuit boards will affect more than one module and must be isolated to the single defective board.

REPAIRS AND MAINTENANCE (continued)

The first step in major troubleshooting is to prove the problem is in the board. With the snake disconnected, if the LEDs function normally from the power supply to the output indicators and control voltage is verified with a meter at the output connector, the board by itself is functioning as it should. Snake channels that are shorted to control common or to another controller will show on the output LEDs when the snake is plugged in. An LED that jumps to full up when the slider is moved above minimum, indicates an output shorted to common or ground. An LED that is off when the fader is partially up can indicate a short between channels. A comprehensive test for shorts is to bring all outputs full up and verify with a meter that each channel can be run from maximum to minimum with the other channels up.

If all LEDs respond normally but no voltage can be read at any of the outputs, the problem is probably a break in the control common between the power supply card and the output connector.

The circuit boards in the console are inter-connected by ribbon cables that carry power and the necessary input and output lines. A defect in one card can affect everything it is connected to. Faults in a 6XDM can affect the entire scene and a short to V+ in any card can kill the entire board. Problems are isolated by removing the ribbon jumpers from suspect modules and then checking the other modules to see if normal operation is restored.

Modules connected by a continuous ribbon are a functional system. Boards with an input and an output are connections between systems.

There are three ribbon jumper systems in a board:

Horizontal ribbon jumpers for each scene of 6XDM's;
These connect to the submaster output, and supply the entire scene.

Vertical jumpers from scene to scene on each 6XDM;
This is 6XDM output/6XEM input jumper.

Submaster input ribbons connecting the scene master output to all submasters; This ribbon may continue to the grand master and power supply or those connections may be made through other cables.

The proper function of the power supply, grand master, crossfader, and submasters can be checked by disconnecting ribbon cables.

REPAIRS AND MAINTENANCE (continued)

By removing possible defective modules from the circuit you will arrive at the point where connecting a system ribbon to a particular module that is connected to nothing else causes the system to malfunction. This pinpoints the problem to that card. Schematics for each PC card are supplied in the next section.

Easier to spot are single failures where a single circuit stops working without affecting other modules. Again, the only way to show definitely that the problem is in a single module is to disconnect it from everything except a “known good” input.

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THE LP-1000 SERIES OPERATIONAL INSTRUCTIONS

The LP-1000 series is a two scene console with a 12 channel preset configured through a pin matrix. The LP-1000 also has a 6 channel chase, a bump system that can change the existing look on stage momentarily, a output trim adjustment, a minimum trim adjustment, a master section, a dipless crossfade and a independent channel section. The LP-1000 series also has a 12 volt dimmable gooseneck work lamp.

This controller uses a power source of 105-125 VAC 50-60 HZ and its output is a continuous DC voltage to all channels.

POWER UP

When the power is applied to the controller the dimmable gooseneck work lamp is immediately accessible. The 2.4 watt bulb is standard equipment in all of our controllers. You can adjust the intensity of the lamp by a clockwise rotation of the knob marked “lite”.

To engage or disengage the controller simply push the rocker switch marked “on”. The green LED marked “power”, located beneath the switch, will be glowing along with the switch itself.

If the LED or switch is not glowing recheck your power cord and be sure the outlet that you are using is operational. If the outlet is operational and the power is still not working, you may have an open breaker. The breaker reset is a red button located next to the AC power cord.

TRIM

Under the “power” LED you will notice another green LED marked “max”. This LED’s brightness is directly related to the amount of output voltage the controller has been adjusted to. The factory trim adjustment is 10 volts, and the trim is accessible from a recessed trim pot located next to the “max” LED. Under the “max” trim control is another recessed control for the minimum output voltage, this is marked “min” and is factory adjusted to zero volts. Do not readjust either of these controls unless there is a reason for the adjustment, such as the implementation of another brand of dimmer. Do this only in accordance with factory instructions, which will be covered in detail under the trim adjustment section.

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CHASER

This is a straight 6 channel chase operating through a preset pin matrix. The chase "on/off" button is a "winking eye" push-push type switch. Above the switch are two slide pots for the chaser rate and intensity controls. The rate pot will vary its speed, the LED located above it will blink at the corresponding rate, and the intensity pot adjusts output level for all chase channels.

The chase channels are sent to the last 6 sections of the pin matrix, that is sections 7-8-9-10-11-12. Whatever output channels are assigned to these sections will be operated by the chase and the corresponding preset controller channels. Example, if you put a diode pin into the pin matrix so that you connect channel 12 to preset 7 every time the first (of 1-6) chase channel turns on, that channel number one will light (See section on pin matrix).

BUMP

In the master section there are two switches and one level pot for the bump buttons. Above the switches are two yellow LED's. These switches allow the operator to use the bump buttons located beneath each of the controller channels to achieve different results.

The switch marked "on/off" is the bump enable switch. The yellow LED will be glowing when this switch and bump buttons are on. When pressing a channel's bump button, while in the "add" mode, that channel will be added, at the intensity of the bump level control. The bump button will "add" that channel to the existing look on stage, it will not effect the scene setup in any other way. If you want you may deactivate the bumps so accidental channel increases will be avoided.

Next to the "on/off" switch is the "solo/add" switch. When the "solo/add" switch is in the "solo" position the yellow LED will glow whenever a bump button is depressed. Also while the button is held down the controller will delete all of the channels that are in the "X" and "Y" scenes, except the channel whose bump button is being held down, which will be at maximum intensity. The solo will be over ridden by the independent and chase functions. This effect will last only as long as the bump button is depressed and when the button is released the scene will return to its normal condition.

HINT: When the "solo" feature is activated only that channel will appear, excluding chase and independent. You may rearrange channels while the bump button is depressed and return to a new stage look. This will give the effect of very fast scene changes with a minimum of fader work.

GRAND MASTER

The “grand master” section has 2 faders and an illuminated blackout switch. The master fader, marked “M”, the independent fader, marked “I”, and the board disable switch, marked “black” are grouped together.

The “M”, master, fader controls only the “crossfader” section and the A, B, C sub-masters. The overall level that is set by the “M” fader can be seen with the LED located directly above it.

The “I”, independent, fader controls only the channels that have been selected “I” by the “A, B, C, M, I” selector switches located above the individual channels. The “I” fader also has a level LED located above it.

The switch marked “black” will disable anything assigned to the “M” fader on the board. This gives the operator instant control over the scene outputs. When the disable function is activated the red LED above it will be glowing.

NOTE: All of the controls in the “grand master” section can be overridden by the chase and the bump sections.

CROSSFADER

The “crossfader” section controls the top, “X” scene, and the middle, “Y” scene, channels. There are two control faders and they operate in reverse order to accomplish a smooth crossing between the scenes. The leftmost fader is marked “X” and it operated the top set of controller’s faders. The fader is at its maximum output when in the upward position. To its right is the “Y” fader, which operates the middle set of controllers. This fader has a maximum output when in the downward position. Also in this section is the bottom, “P” scene, preset master fader. This has a maximum level when in the up position.

With both crossfader controls in the up position the look on stage is accomplished from the levels of the “X” scene controllers and the “Y” scene fader is off. The operator sets up the next stage look to be used on the “Y” scene controls. When it is time to change the look on the stage the operator brings both “crossfader” controls to the down position. This turns down the “X” scene and turns up the “Y” scene. Creating a smooth scene transition with a rate determined by the operator.

CONTROL CHANNELS

The control section is at the right of the board. This section contains the individual channel faders, the “A, B, C, I, M” switches, the bump buttons and output LEDs.

The output LEDs located at the top are directly related to that channels output. The five position slide switches located beneath the output LEDs select either the submasters, “A, B, C”, the manual, “M”, or the independent, “I”, as a fader source for that channel. The momentary switches at the bottom of each channel are for the bump button operations.

PIN MATRIX

The pin matrix (located in the lower right hand side of the console) is a circuit board that allows channels to be connected together by the use of diode pins. This feature will allow the operator to preselect scenes rather then going back and forth between the “X” and “Y”. The operator will be able to bring up one preset channel and bring down another to accomplish a crossfade between scenes.

Horizontally across the top of the pin matrix board are channels 1 thru 24. These correspond to channels 1-24 in the X-Y scenes. Vertically, on the left side of the matrix, are numbers 1 thru 12 and these correspond to the preset faders 1-12. You assign outputs to presets by the use of diode pins, not shorting pins or diode pins of the wrong polarity.

Example: You have an interesting look in the “X” scene with channels 1, 15, 17, and 23. You would like to bring them up together with one fader. You open your matrix lid, take a diode pin and move across the numbers horizontally until you find #1, you did not have to go far. Then you move down the left side vertically until you get to preset number 6, this can be any submaster channel. Now put the diode pin in the location 1-6. Take another diode pin and go horizontally on the matrix to channel #15, go down vertically to preset channel #6 and insert that diode pin. You should continue to do this for channels 17 and 23. After you have finished you will have pins 1, 15, 17, and 23 in the vertical row of preset #6. If you bring up preset #6, and all other channels down, you will bring up control outputs #1, 15, 17, and 23. Now you can program the other 11 presets.

The last 6 preset positions, 7, 8, 9, 10, 11, and 12 are also connected to the chaser function. The first step in the chase is #7, the second step is #8 and so on to step #12. Whatever you have pined into these presets can also be operated by running the chase. You have the option of operating them together or separately.

ABC-SUBMASTERS

At the beginning of the "X" and "Y" scenes, to the left of channel 1, are submasters. These submasters are labeled "A", "B" and "C" and they have a two position switch located above them. These switches will allow the submaster to be controlled by either the corresponding "X" or "Y" crossfader, or the "I" independent master fader.

Above each of the controller channels is a 5 position switch. This switch will reroute that channel to a different submaster fader. While operating in the "X" scene if you put the selector switch in the "A" position. This fader will be controlled by the "A" submaster fader. The level of the channel you are using needs to be up in order for output to appear on that channel.

TRIM ADJUSTMENT

To adjust the trim of any LEPRECON controller you need a volt meter and a small flat blade screwdriver. The first item that should be done is to determine which pin is common with your controller.

On the LP-1000 there is a 27 pin cinch jones type connector. On the 27 pin CJ, pins 26 and 27 are common and pin 25 is a 28 volt DC source that is used for another brand of dimmers.

You will need to first turn on your controller. Then with your volt meter's negative lead connected to the controller's common pin and the positive lead connected to channel number one you then raise all channels to maximum. With all channels up and a screwdriver in the recessed trim pot you adjust the "max" trim to the desired level, factory adjustment is 10 volts.

To adjust the minimum voltage you bring only channel one down, all other channels must remain at maximum output. With the screwdriver in the "min" pot you turn it counterclockwise to the near zero position.

Once the trim has been adjusted it does not need to be readjusted unless another brand of dimmers have been introduced.